

## The Botanical Laboratory at Oxford.

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In 1886 I published a short account of the botanic garden, library and herbarium of Oxford,<sup>1</sup> to which I must refer readers who wish to get some information about the history and the resources of this botanical institution. I will only repeat here that these resources are very extensive, as the laboratory is situated in a botanic garden which, though not very large, contains representatives of almost all natural orders, and is connected with a very large herbarium and a good library. In the present paper I wish only to offer a few remarks about the arrangements in the laboratory, which have all been made under the direction of Professor Isaac Bayley Balfour, though the different rooms composing it were built before his time.

Having entered the botanic garden through the magnificent old porch opposite the famous tower of Magdalen College, one sees on the right a rather large building with two wings attached to it. The central part of this building contains the lecture-room, the botanical museum and a chemical laboratory (the latter belonging to Magdalen College), while the wings form the botanical laboratory. If we enter the first wing we find ourselves in a room which in future will be fitted out as a physiological laboratory, the other wing being used for morphological studies. In the former we see,

<sup>1</sup> Botanisches Centralblatt Bd. xxv, No. 16.



first of all, a big cultivator, in which plants can be grown at constant temperatures. It further contains several bacteriological instruments, such as an incubator, a hot-air sterilizer and a steam sterilizer. Along the walls stand a number of cases in which thermometers, hygrometers, pipettes, burettes, bottles and flasks of different kinds, staining materials, imbedding materials, slides, cover slips, double-wall jars (which can be filled with colored fluids so as to grow plants with colored light), disks, glass boxes, etc., are kept in stock. In this room a great number of chemical reagents, glass tubes, etc., are also kept. There is a small room adjoining, which is the professor's private room, and in which all delicate instruments are kept when not in use, *e. g.*, an auxanometer, a galvanometer, a klinostat, a chemical balance, microscopes, microtomes, polariscope, microspectroscope, a magic-lantern, etc.; also, a large collection of slides for the magic-lantern and several other things. Leaving the first mentioned room by another door, we come to a staircase which leads into the museum. The latter contains a large collection of models and specimens (both in spirit and dry). Perhaps I shall describe the museum more in detail in a future article; at present I will only mention that it is chiefly to serve as a place where the materials necessary for showing in lectures are kept, not as a place for the instruction of the public. Having passed this staircase, we see on the left hand side a small room which can be completely darkened. It is used for photographic purposes, but of course it can also be made available for growing plants, either in complete darkness or with colored light. The laboratory possesses a very good microphotographic apparatus by Zeiss. We now pass into the lecture-room. On the walls we notice, among other things which are hardly worth mentioning, Noll's apparatus for demonstrating the secondary growths of woody stems. There is nothing else in the front part of the room which attracts our attention, except, perhaps, a plain lecture table and benches for the students; but in the back part we see a large stand with glass dishes, etc. This is the same stand which the late Mr. Thomas Walton exhibited in 1886 at the Birmingham meeting of the British Association for the Advancement of Science for growing algæ and other organisms in sea water or fresh water. It is very ingeniously constructed, but its arrangement can not be clearly explained without diagrams. Owing to circumstances which could not be foreseen, it has not yet worked very well here; but it is



expected that the present difficulties will soon be overcome. Opposite the stand there are a number of cases which contain a large collection of systematically arranged diagrams and drawings for use in lectures. Among them are the well-known diagrams by Kny and Dodel-Port.

Entering now the other wing of the building, we first come into a small coat-room, and then we reach the morphological laboratory. This is a spacious room provided with large windows which are almost as high as the room itself. There is very little space left between them, so that they afford very good light. Unfortunately, they look toward the south, which is a great drawback, as blinds have to be used when the sun shines. The students occupy tables which form a row along the windows. These tables are quite plain and strongly built. I do not think that it is necessary to have any specially constructed desk for morphological botanical work, either microscopical or macroscopical. Each table is provided with two gas lamps, as usually two students work at one table. On each of them there is a stand on which bottles containing reagents can be placed in such a way that they are protected from the direct sunlight. The bottles used for reagents are those known as glass-capped bottles. As each of them has its separate glass rod, the reagents are always kept pure. This is a rather important point, often too little valued by beginners. The following is a list of reagents which every student preparing for the preliminary examination<sup>2</sup> receives: glycerine, Schultze's solution, solution of iodine in water (with KI), sulphuric acid, hydrochloric acid, acetic acid, potash, aniline sulphate (dissolved in dilute sulphuric acid), solution of phloroglucin, Kleinenberg's Hæmatoxylin, solution of iodine in pure water (the latter when required). Of course, more advanced students get everything that is necessary in modern microscopic technique. It may be mentioned here that boiling of tissues with Schultze's macerating fluid is always done in the small room which leads into the morphological laboratory. Besides these reagents, every student receives a bottle of methylated spirit, a bottle of distilled water, several small dishes and glass boxes, some blotting-paper, a dissecting microscope, a compound microscope and a moist chamber (the latter when required). He has to provide himself with slides, cover-slips, a good hollow-ground razor, a few scalpels, a pair of scissors, a few needles, a few camel-hair brushes of different sizes, a

<sup>2</sup> An examination which every student of science or medicine has to pass before entering into special studies.



sketch-book and drawing implements. The practical teaching of the "preliminary men" is, on the whole, guided by "Bower and Vines' Practical Botany." A sufficient supply of material for these men is always kept in spirit, but fresh specimens are examined whenever this is required and the season is favorable. A collection of microscopical preparations illustrating Bower and Vines' book is kept in order to be shown whenever a student, after several attempts, fails to get a sufficiently good preparation himself. The middle part of the room is occupied by two large tables, which serve for various purposes at different times and are very useful. Along the rear wall there is a bench with several sinks for washing plants, bottles, etc., several warm chambers, imbedding apparatus, Bunsen burners, etc. Above these are several shelves on which a great many things frequently used are placed, such as jugs, dishes, bottles, a rough balance, a distilling apparatus, large bottles containing spirit, solutions of chromic acid and picric acid, common salt, distilled water, smaller bottles filled with potash, soda, several acids, alcohol of different strengths, Schultze's macerating fluid, etc. Along the other walls there are cupboards, in which a pretty large collection of systematically arranged materials for investigation, chiefly preserved in spirit, is kept. The material for the "preliminary men" is kept separate or arranged according to Bower and Vines' book. There are also a number of smaller cupboards, each with a separate key, in which the students keep their private property. In describing our laboratory I have endeavored to enumerate at the same time most things necessary for a botanical laboratory. In conclusion I may mention that anybody interested in the construction of a new laboratory will find much useful information in a book by E. C. Robins, entitled, "Technical School and College-Building." (London, 1887. Whittaker & Co.)  
*Oxford, England.*

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### Zygomorphy and its causes. III.

CHARLES ROBERTSON.

When shallow gamopetalous flowers become horizontal, they are subject to the same conditions as polypetalous flowers, and, like them, are apt to become sternotribe.